

What is claimed is:

1. A signal processing unit which calculates the value of  $v^p$ , where  $v$  is an item of floating point data made up from an E-bit exponent part and an F-bit mantissa part, and  $p$  is a constant, comprising:

an exponent part extraction section which extracts a bit series from said exponent part of said floating point data item;

a mantissa part extraction section which extracts the most significant K bits from said mantissa part of said floating point data item;

a first conversion section which inputs the output  $e$  of said exponent part extraction section and outputs the value of a function  $X(e)$  thereof;

a second conversion section which inputs the output  $f$  of said mantissa part extraction section and outputs the value of a function  $Y(f)$  thereof; and

a multiplier section which multiplies together the output value from said first conversion section and the output value from said second conversion section;

wherein:

when  $i$  and  $j$  are taken as integers, said function  $X(i)$  is a function which returns the value:

$$X(i)=2^{((i-((1<E-1)-1)-K)*p)},$$

and said function  $Y(j)$  is a function which returns the value:

$$Y(j)=((1<K)+j)^p.$$

5           2. A signal processing unit according to claim 1, wherein:  
said first conversion section is constituted as a table in  
which, for each address  $i$ , the value of  $X(i)$  is stored in  
advance; and

          said second conversion section is constituted as a table in  
which, for each address  $j$ , the value of  $Y(j)$  is stored in  
advance.

          3. A signal processing unit which calculates the value of  
 $v^p$ , where  $v$  is an item of floating point data made up from an  
E-bit exponent part and an F-bit mantissa part, and  $p$  is a  
constant, comprising:

          an exponent part extraction section which extracts a bit  
series from said exponent part of said floating point data item;

          a mantissa part extraction section which extracts the most  
20 significant  $K$  bits from said mantissa part of said floating  
point data item;

a first conversion section which inputs the output e of said exponent part extraction section and outputs the value of a function X(e) thereof;

5 a second conversion section which inputs the output f of said mantissa part extraction section and outputs the value of a function Y(f) thereof; and

a multiplier section which multiplies together the output value from said first conversion section and the output value from said second conversion section;

10 wherein:

when i and j are taken as integers, for some real number S, said function X(i) is a function which returns the value:

$$X(i) = 2^{((i - ((1 < E - 1) - 1) - K) * p) * S},$$

and said function Y(j) is a function which returns the value:

$$Y(j) = ((1 < K) + j)^{p/S}.$$

4. A signal processing unit according to claim 3, wherein:

20 said first conversion section is constituted as a table in which, for each address i, the value of X(i) is stored in advance;

and said second conversion section is constituted as a table in which, for each address j, the value of Y(j) is stored in advance.

5. A signal processing unit which, where  $v$  is an item of floating point data made up from an  $E$ -bit exponent part and an  $F$ -bit mantissa part, when the value of  $v$  is greater than or equal to  $2.0$  and less than  $2^N$ , where  $N$  is a natural number, calculates and outputs the value of  $v$  raised to the power  $1$  and converted to an integer value, comprising:

an exponent and mantissa part extraction section which, when the number of bits in which  $(N-2)$  is expressed in binary notation is  $M$ , extracts a bit field consisting of at least the lowermost  $M$  bits of said exponent part and at least the uppermost  $(N-1)$  bits of said mantissa part; and:

a third conversion section which, when the value expressed by said bit field which has been extracted by said exponent and mantissa part extraction section is  $w$ , stores in a table in advance the values of  $v$  converted into integer values in all the addresses  $w$  extracted by this bit field, and which inputs the value  $w$  given by said bit field and reads out the corresponding value from said table.

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6. A signal processing method operable to calculate the value of  $v^p$ , where  $v$  is an item of floating point data made up

from an E-bit exponent part and an F-bit mantissa part, and p is a constant, comprising the steps of:

extracting a bit series from said exponent part of said floating point data item;

5 extracting the most significant K bits from said mantissa part of said floating point data item;

inputting the output e of the exponent part extraction and outputting the value of a function  $X(e)$  thereof, by storing in a table, for integer values of i, values  $X(i)$  to be returned given by  $2^{((i - ((1 \leq E - 1) - 1) - K) * p)}$ ;

inputting the output f of the mantissa part extraction and outputting the value of a function  $Y(f)$  thereof, by storing in a table, for integer values of j, values  $Y(j)$  to be returned given by  $((1 \leq K) + j)^p$ ; and:

15 multiplying together the output values of said functions  $X(e)$  and  $Y(f)$ .

7. A signal processing method for, where v is an item of floating point data made up from an E-bit exponent part and an F-bit mantissa part, when the value of v is greater than or  
20 equal to  $2.0$  and less than  $2^N$ , where N is a natural number, calculating and outputting the value of v raised to the power 1 and converted to an integer value, comprising the steps of:

when the number of bits in which (N-2) is expressed in binary notation is M, extracting a bit field consisting of at least the lowermost M bits of said exponent part and at least the uppermost (N-1) bits of said mantissa part; and:

5        when the value expressed by said bit field which has been thus extracted is w, storing in a table in advance the values of v converted into integer values in all the addresses w extracted by this bit field, and inputting the value w given by said bit field and reading out the corresponding value from said table.

8. A computer readable medium storing instructions for performing a signal processing method operable to calculate the value of  $v^p$ , where v is an item of floating point data made up from an E-bit exponent part and an F-bit mantissa part, and p is a constant, comprising the steps of:

extracting a bit series from said exponent part of said floating point data item;

extracting the most significant K bits from said mantissa part of said floating point data item;

20        inputting the output e of the exponent part extraction and outputting the value of a function X(e) thereof, by storing in a table, for integer values of i, values X(i) to be returned given by  $2^{((i-((1 \leq E-1)-1)-K)*p)}$ ;

inputting the output  $f$  of the mantissa part extraction and outputting the value of a function  $Y(f)$  thereof, by storing in a table, for integer values of  $j$ , values  $Y(j)$  to be returned given by  $((1 \leq K) + j)^p$ ; and:

5 multiplying together the output values of said functions  $X(e)$  and  $Y(f)$ .

9. A computer readable medium storing instructions for performing a signal processing method for, where  $v$  is an item of floating point data made up from an  $E$ -bit exponent part and an  $F$ -bit mantissa part, when the value of  $v$  is greater than or equal to  $2.0$  and less than  $2^N$ , where  $N$  is a natural number, calculating and outputting the value of  $v$  raised to the power  $1$  and converted to an integer value, comprising the steps of:

when the number of bits in which  $(N-2)$  is expressed in binary notation is  $M$ , extracting a bit field consisting of at least the lowermost  $M$  bits of said exponent part and at least the uppermost  $(N-1)$  bits of said mantissa part; and:

when the value expressed by said bit field which has been thus extracted is  $w$ , storing in a table in advance the values of  $v$  converted into integer values in all the addresses  $w$  extracted by this bit field, and inputting the value  $w$  given by said bit field and reading out the corresponding value from said table.

10. A program product for performing a signal processing method operable to calculate the value of  $v^p$ , where  $v$  is an item of floating point data made up from an  $E$ -bit exponent part and an  $F$ -bit mantissa part, and  $p$  is a constant, comprising the  
5 steps of:

extracting a bit series from said exponent part of said floating point data item;

extracting the most significant  $K$  bits from said mantissa part of said floating point data item;

inputting the output  $e$  of the exponent part extraction and outputting the value of a function  $X(e)$  thereof, by storing in a table, for integer values of  $i$ , values  $X(i)$  to be returned given by  $2^{((i - ((1 < E - 1) - 1) - K) * p)}$ ;

inputting the output  $f$  of the mantissa part extraction and outputting the value of a function  $Y(f)$  thereof, by storing in a table, for integer values of  $j$ , values  $Y(j)$  to be returned given by  $((1 < K) + j)^p$ ; and:

20 multiplying together the output values of said functions  $X(e)$  and  $Y(f)$ .

11. A program product for performing a signal processing method for, where  $v$  is an item of floating point data made up



from an E-bit exponent part and an F-bit mantissa part, when the value of  $v$  is greater than or equal to 2.0 and less than  $2^N$ , where  $N$  is a natural number, calculating and outputting the value of  $v$  raised to the power 1 and converted to an integer value, comprising the steps of:

when the number of bits in which  $(N-2)$  is expressed in binary notation is  $M$ , extracting a bit field consisting of at least the lowermost  $M$  bits of said exponent part and at least the uppermost  $(N-1)$  bits of said mantissa part; and:

when the value expressed by said bit field which has been thus extracted is  $w$ , storing in a table in advance the values of  $v$  converted into integer values in all the addresses  $w$  extracted by this bit field, and inputting the value  $w$  given by said bit field and reading out the corresponding value from said table.